CLAIMS

1. A method of communications, comprising:

dividing a plurality of subscriber stations into a plurality of groups;

assigning a different plurality of orthogonal codes to each of the groups, the number of the orthogonal codes assigned to one of the groups being less than the number of subscriber stations in said one of the groups;

encoding communications to one of the subscriber stations in said one of the groups at a data rate; and

determining whether to spread at least a portion of communications to said to one of the subscriber stations with one of the orthogonal codes assigned to said one of the groups as a function of the data rate.

2. The method of claim 1 further comprising allocating to said one of the subscriber stations one or more of the orthogonal codes assigned to said one of the groups, said one of the orthogonal codes being selected from the one or more of the orthogonal codes allocated to said one of the subscriber stations.

3. The method of claim 1 further comprising allocating to each of the subscriber stations in said one of the groups one or more of the orthogonal codes assigned to said one of the groups, and using each of the orthogonal codes in said one of the groups to spread at least a portion of communications to different subscriber stations in said one of the groups, the orthogonal code being used to spread said at least a portion of the communications to each of the different subscriber stations being selected from the respective one or more of the codes allocated thereto.

4. The method of claim 1 further comprising spreading a second portion of the communications to said one of the subscriber stations with a second orthogonal code different from each of the orthogonal codes assigned to the groups.

5. The method of claim 4 wherein the data rate of the communications comprises a full rate and less than a full rate, and wherein said at least a portion of the communications to said one of the subscriber stations is spread with said one of the orthogonal codes when the data rate of the communications is the full rate, and wherein said at least a portion of the communications to said one of the subscriber stations is not spread with said one of the orthogonal codes when the data rate of the communications is less than the full rate.

6. A communications station, comprising:

a processor configured to divide a plurality of subscriber stations into a plurality of groups, and assign a different plurality of orthogonal codes to each of the groups, the number of the orthogonal codes assigned to one of the groups being less than the number of subscriber stations in said one of the groups; and

an encoder configured to encode communications to one of the subscriber stations in said one of the groups at a data rate;

wherein the processor is further configured to determine whether to spread at least a portion of the communications to said one of the subscriber stations with one of the orthogonal codes assigned to said one of the groups as a function of the data rate.

7. The communications station of claim 6 wherein the orthogonal codes assigned to said one of the groups each have the same length.

8. The communications station of claim 6 wherein the processor is further configured to allocate to said one of the subscriber stations one or more of the orthogonal codes assigned to said one of the groups, said one of the orthogonal codes being selected from the one or more of the orthogonal codes allocated to said one of the subscriber stations.

9. The communications station of claim 6 wherein the encoder is further configured to encode communications to the subscriber stations in said one of the groups, and wherein the processor is further configured to allocate one or more of the orthogonal codes assigned to said one of the groups to each of the

subscriber stations in said one of the groups, and use each of the orthogonal codes in said one of the groups to spread at least a portion of the communications of different ones of the subscriber stations in said one of the groups, the orthogonal code being used to spread said at least a portion of the communications to each of the different ones of the subscriber stations being selected from the respective one or more of the codes allocated thereto.

10. The communications station of claim 9 wherein a different combination of the orthogonal codes are allocated to each of the subscriber stations in said one of the groups.

11. The communications station of claim 9 wherein a same combination of the orthogonal codes are allocated to a plurality of the subscriber stations in said one of the groups.

12. The communications station of claim 6 further comprising a modulator configured to spread a second portion of the communications to said one of the subscriber stations with a second orthogonal code different from each of the orthogonal codes assigned to the groups.

13. The communications station of claim 12 wherein the data rate of the communications comprises a full rate and less than a full rate, the communications station further comprising a modulator configured to spread said at least a portion of the communications to said one of the subscriber stations when the data rate of the communications is the full rate, and not spread said at least a portion of the communications to said one of the subscriber stations when the data rate of the communications is less than the full rate.

14. The communications station of claim 13 wherein the less than full rate comprises a data rate equal to ½ the full rate.

15. The communications station of claim 14 wherein the less than full rate comprises a data rate equal to ¼ the full rate and a data rate equal to 1/8 the full rate.

16. The communications station of claim 15 wherein the encoder comprises a vocoder.

17. A communications station, comprising:

means for dividing a plurality of subscriber stations into a plurality of groups;

means for assigning a different plurality of orthogonal codes to each of the groups, the number of the orthogonal codes assigned to one of the groups being less than the number of subscriber stations in said one of the groups;

means for encoding communications to one of the subscriber stations in said one of the groups at a data rate; and

means for determining whether to spread at least a portion of the communications to said one of the subscriber stations with one of the orthogonal codes assigned to said one of the groups as a function of the data rate.

18. A communications station, comprising:

memory having an assignment matrix having *n* rows, *k* columns, *l* number of ones in each of the rows, and *k-l* number of zeros in each of the rows, where *n* = a number of subscriber stations assigned to a group, *k* equals a number of orthogonal codes assigned to the group, and *l* = a number of the orthogonal codes allocated to each of the *n* subscriber stations from the *k* number of orthogonal codes assigned to the group;

means for constructing a second matrix having *k* rows selected from the assignment matrix; each of the *k* rows corresponding to one of *k* subscriber stations selected from the *n* subscriber stations;

means for permuting the rows of the second matrix such that a diagonal extending from the first column to the *kth* column comprises all ones; and

means for assigning one of the *k* orthogonal codes to each of the *k* subscriber stations as a function of the permuted second matrix.

19. The communications station of claim 18 wherein *l* is the lowest integer that satisfies the following equation:

$$l > k(n-k)/n.$$

20. The communications station of claim 18 wherein the means for permuting the rows of the second matrix comprises means for cyclically shifting the rows of the second matrix vertically until the diagonal extending from the first column to the *kth* column comprises all ones.

21. The communications station of claim 18 wherein $k = n/2$, $l = (k+1)/2$, *and* $n = 6+4i$, where *i* is any non-negative integer.

22. The communications station of claim 18 wherein $k = (n/2)+1$, $l = k/2$, *and* $n = 6+4i$, where *i* is any non-negative integer.

23. The communications station of claim 18 wherein $k = n/2$, $l = (k+1)/2$, *and* $n = 5+4i$, where *i* is any non-negative integer.

24. The communications station of claim 18 wherein $k = (n/2)+1$, $l = k/2$, *and* $n = 5+4i$, where *i* is any integer greater than 1.

25. The communications station of claim 18 wherein the assignment matrix includes all ones in the first *l* columns of the first row and all zeros in the remaining columns of the first row, and wherein each of the remaining rows of the assignment matrix are cyclically shifted horizontally by one bit from the row immediately above it.

26. The communications station of claim 18 wherein the assignment matrix comprises a submatrix comprising the first *k-1* columns, the submatrix comprising all ones in the first *l* columns of the first row and all zeros in the remaining columns of the first row, and wherein each of the remaining rows of the submatrix are cyclically shifted horizontally by one bit from the row

immediately above it, and wherein the *kth* column includes all zeros in the upper *n/2* rows and all ones in the lower *n/2* rows.

27. The communications station of claim 18 further comprising means for constructing an intermediate matrix including all ones in the first *l* columns of the first row and all zeros in the remaining columns of the first row, and wherein each of the remaining rows of the intermediate matrix are cyclically shifted horizontally by one bit from the row immediately above it, and wherein the assignment matrix comprises *n* rows from the intermediate matrix, where *n* is less than or equal to the number of rows in the intermediate matrix and $n \geq k$.

28. The communications station of claim 18 further comprising means for constructing an intermediate matrix having a number of rows and *k* columns, the intermediate matrix including a submatrix comprising the first *k-1* columns, the submatrix comprising all ones in the first *l* columns of the first row and all zeros in the remaining columns of the first row, and wherein each of the remaining rows of the submatrix are cyclically shifted horizontally by one bit from the row immediately above it, and wherein the *kth* column of the intermediate matrix includes all zeros in the upper half of the rows and all ones in the bottom half of the rows, and wherein the assignment matrix comprises *n* rows from the intermediate matrix, where *n* is less than or equal to the number of rows in the intermediate matrix and $n \geq k$.